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DIAGNOSTIC INSTRUCTION FOR SPARK PROTECTION UNIT

OMNICOMM BIS-MX

CONTENT

INTRODUCTION

This document is intended for conducting diagnostics of the Spark protection unit Omnicomm BIS-MX and outlines the methods and sequence of steps for completing the Diagnostic Report.

Before starting the diagnostics, it is necessary to inspect the Spark protection unit Omnicomm BIS-MX for the absence of mechanical damage and signs of chemical exposure. The housing, connecting cable, and connector must not have any damage or signs of corrosion.

1. DIAGNOSTIC EQUIPMENT

For diagnosing the Spark protection unit Omnicomm BIS-MX, the following equipment is required:

- Multimeter. A multimeter capable of measuring Voltage, current, and resistance is essential for comprehensive diagnostics.
- Power Supply. An appropriate power source is necessary. This can be a fixed 12V, 1A-3A DC power supply or a laboratory (adjustable) power supply with a Voltage range of 0-30V and a current range of 0-3A DC. The Spark protection unit Omnicomm BIS-MX itself operates with a supply Voltage between +8V and +50V.

Additionally, each piece of diagnostic equipment should have a valid certificate of conformity and a calibration certificate to ensure measurement accuracy and compliance with safety standards.

This equipment is essential to safely and accurately diagnose the Spark protection unit Omnicomm BIS-MX, which is designed to protect intrinsic safety circuits interfacing fuel level sensors Omnicomm LLS in hazardous areas with external devices in safe zones.

2. GENERAL RECOMMENDATIONS

Before performing diagnostics, it is recommended to carefully read the instructions and follow the provided information to prevent measurement errors and avoid damage to the Spark protection unit Omnicomm BIS-MX.

Special Control Points During Diagnostics:

1. The color coding of connecting wires varies for all types of fuel level sensors Omnicomm LLS. To avoid connection errors when diagnosing the Spark protection unit Omnicomm BIS-MX safety, it is necessary to use the mounting cable from the fuel level sensors Omnicomm LLS 4 and/or LLS 5 supply kit.
2. Do not allow uninsulated connecting wires to short-circuit during diagnostics to prevent a short circuit and damage to the Spark protection unit Omnicomm BIS-MX.
3. Unused connecting wires during diagnostics must be insulated to avoid short circuiting and damage to the Spark protection unit Omnicomm BIS-MX.
4. For accurate measurements, ensure reliable contact of the connecting wires with the diagnostic equipment.
5. When connecting and/or joining wires, it is recommended to use electrical terminals (quick-release connectors).
6. All measurements of input circuits must be made relative to the white wire (power negative).
7. All measurements of output circuits must be made relative to the white wire (power negative).
8. When measuring resistance, the power supply (positive) to the Spark protection unit Omnicomm BIS-MX must be disconnected.

3. GENERAL PURPOSE OF SPARK PROTECTION UNIT OMNICOMM BIS-MX CONNECTORS

Typical Pin Assignments for Spark protection unit Omnicomm BIS-MX Connectors (Based on fuel level sensors Omnicomm LLS and BIS 20240 Analogies)

Power Supply:

- +Power (positive Voltage input): Brown wire
- Ground (negative, common): White wire

Communication Interfaces:

- RS-485 A: Orange-white wire
- RS-485 B: White-blue wire
- RS-232 Tx (Transmit): Pink wire
- RS-232 Rx (Receive): Gray wire

Summary Table (based on fuel level sensors Omnicomm LLS-Ex 5 cable colors)

Signal Name	Wire Color	Notes
+Power (+U)	Brown	Power supply positive
Common (GND)	White	Power supply negative (ground)
RS-485 A	Orange-white	Differential pair A
RS-485 B	White-blue	Differential pair B
RS-232 Tx	Pink	Transmit data
RS-232 Rx	Gray	Receive data

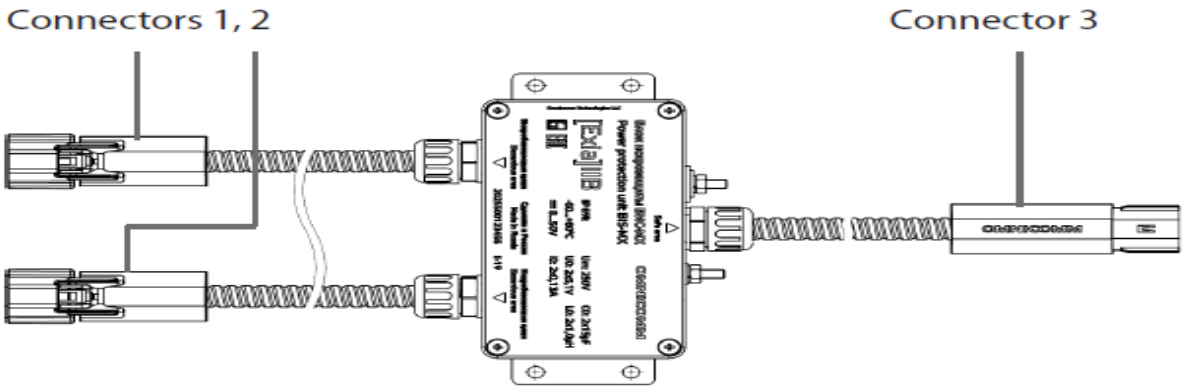

Figure 1. Connectors BIS-MX

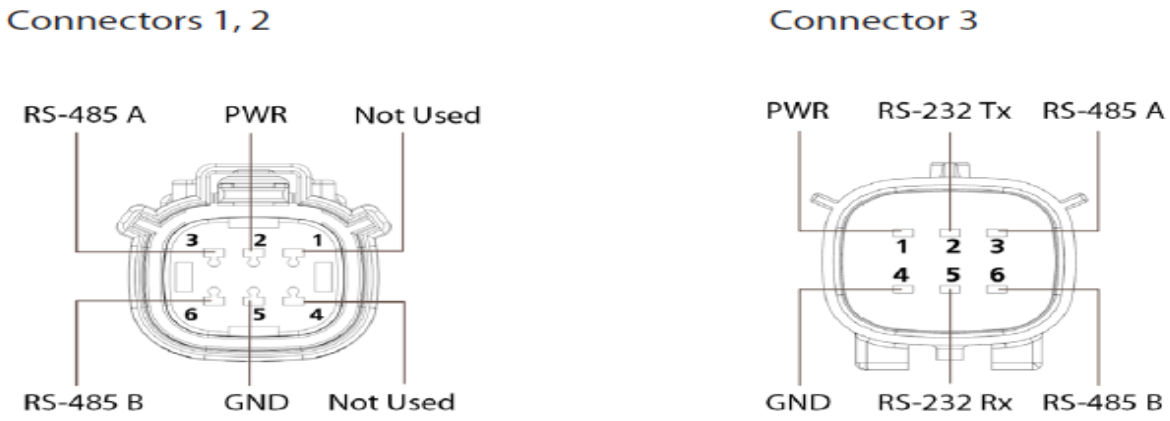

Figure 2. Connectors BIS-MX

4. MEASUREMENTS OF CONTROL POINTS FOR THE SPARK PROTECTION UNIT OMNICOMM BIS-MX

The Spark protection unit Omnicomm BIS-MX is designed to ensure intrinsic safety by limiting Voltage and current parameters in circuits connecting fuel level sensors Omnicomm LLS located in hazardous zones to devices in safe zones. Measuring control points during diagnostics focuses on verifying electrical parameters within specified intrinsic safety limits.

Key Electrical Parameters to Measure:

Parameter	Value
Maximum input Voltage (Ui)	5.5 V (for fuel level sensors Omnicomm LLS-Ex 5 input)
Maximum input current (Ii)	0.06 A
Maximum internal capacitance (Ci)	10 µF
Maximum internal inductance (Li)	0.5 mH

Characteristic	Value for 2.5 V outputs
Maximum external capacitance (Co)	2 x 15 µF
Maximum external inductance (Lo)	2 x 1.0 mH
Maximum input Voltage (Um)	≥ 250 V
Maximum output Voltage (Uo)	2 x 6.95 V
Maximum output current (Io)	2 x 0.463 A

Purpose of Measurements:

- Ensure intrinsic safety compliance by verifying that electrical parameters fall within explosion-safe limits.
- Detect anomalies such as shorts, open circuits, or out-of-range Voltages/currents that may compromise the safe operation of the Fuel level sensor system.
- Confirm operability of sensors and the Spark protection unit Omnicomm BIS-MX by checking successful identification and communication through diagnostic tools.

These control point measurements are critical to maintaining safety and reliability in explosive environments where fuel level monitoring with fuel level sensors Omnicomm is deployed. For detailed procedures and exact measurement points, consult the official Spark protection unit Omnicomm BIS-MX and fuel level sensors Omnicomm LLS-Ex 5 manuals.

4.1 Power supply Voltage of the Spark protection unit Omnicomm BIS-MX

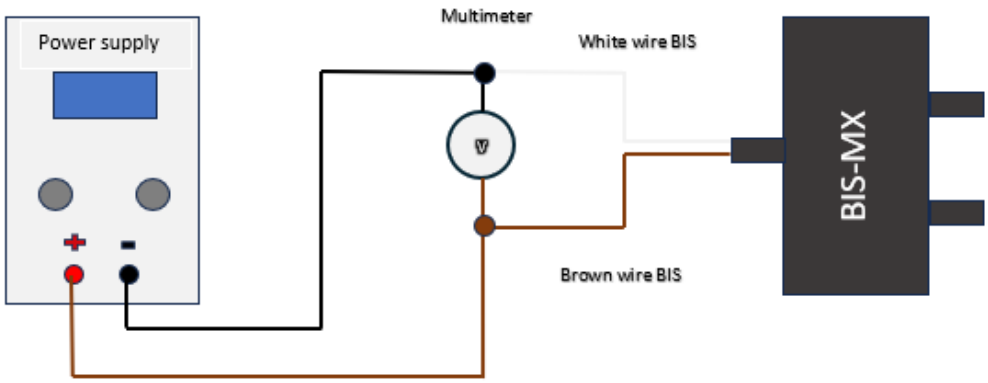

Fig. 1 Connection Diagram

1. Set the power supply Voltage to 12 Volts.
2. Switch the multimeter to Voltage measurement mode (range 20 Volts DC).
3. Assemble the connection circuit according to "Fig. 1 Connection Diagram".
4. Connect the brown wire (+Power input) of the Spark protection unit Omnicomm BIS-MX to the positive GPS-tracker Omnicomm of the power supply.
5. Connect the white wire (-Power input) of the Spark protection unit Omnicomm BIS-MX to the negative GPS-tracker Omnicomm of the power supply.
6. Turn on the power supply.
7. Verify on the multimeter that the power supply Voltage to the sensor is present (the measured Voltage should correspond to the set Voltage on the power supply).

4.2 Current consumption of the Spark protection unit Omnicomm BIS-MX

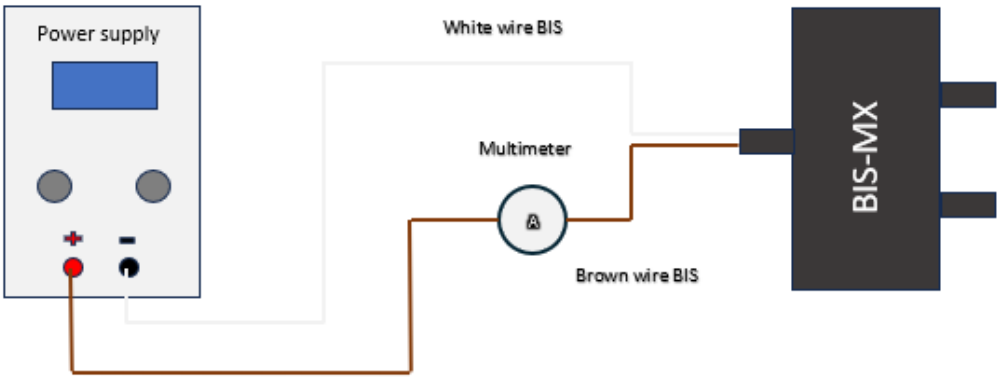

Fig. 2 Connection Diagram

1. Set the power supply Voltage to 12 Volts.
2. Set the multimeter to current measurement mode, with a range of 10 Amperes.
3. Assemble the connection circuit according to “Fig. 2 Connection Diagram”.
4. Connect the brown wire (+ power input) of the Spark protection unit Omnicomm BIS-MX to the positive GPS-tracker Omnicomm of the power supply through the ammeter (multimeter).
5. Connect the white wire (- power input) of the Spark protection unit Omnicomm BIS-MX to the negative GPS-tracker Omnicomm of the power supply.
6. Turn on the power supply.
7. Check the multimeter reading to confirm there is no short circuit in the BIS-MX power supply circuit.
8. If the current consumption does not exceed 100 mA, switch the multimeter to milliampere (mA) current measurement mode for more precise reading.
9. Record the multimeter reading in the Diagnostic Report under the section: “Current consumption at 12 V (without fuel level sensors Omnicomm LLS)”.

4.3 Resistance of the Spark protection unit Omnicomm BIS-MX circuit

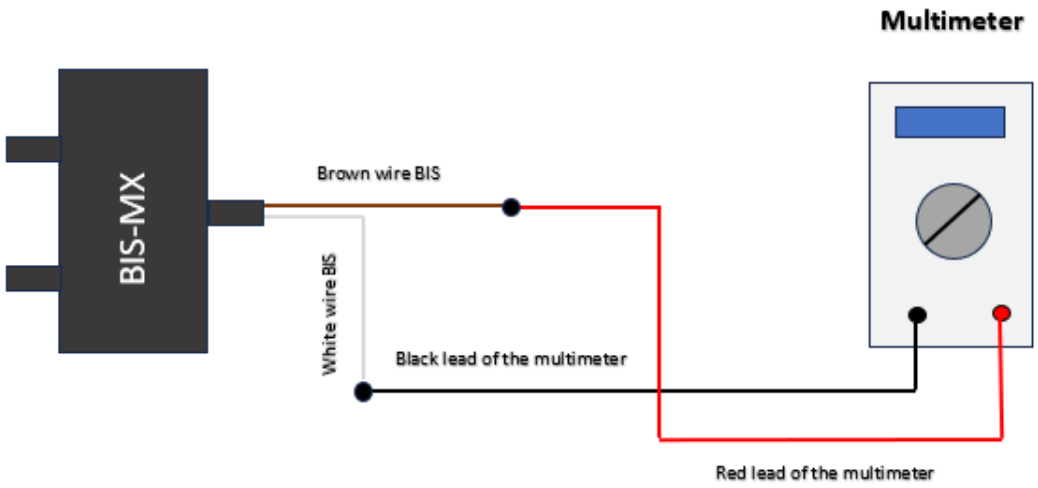

Fig. 3 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 3 Connection Diagram”.
3. Connect the brown wire of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the white wire of the Spark protection unit Omnicomm BIS-MX to the black (negative) lead of the multimeter.
5. Record the multimeter reading in the Diagnostic Report under the section: “Input circuits, positive power supply (brown wire)”.

4.4 Measuring the resistance of the RS-485A interface line of the Spark protection unit Omnicomm BIS-MX

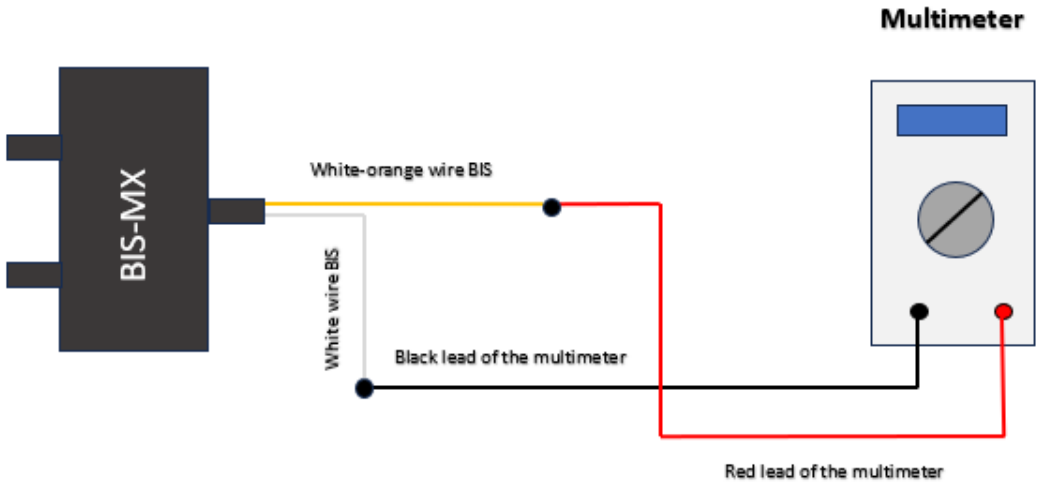

Fig. 4 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 4 Connection Diagram”.
3. Connect the white-orange wire (RS-485 A) of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the white wire (common ground) of the Spark protection unit Omnicomm BIS-MX to the black (negative) lead of the multimeter.
5. Record the resistance reading from the multimeter in the Diagnostic Report under the entry: “Input circuits RS-485 A”.

4.5 Measuring the resistance of the RS-485B interface line of the Spark protection unit Omnicomm BIS-MX

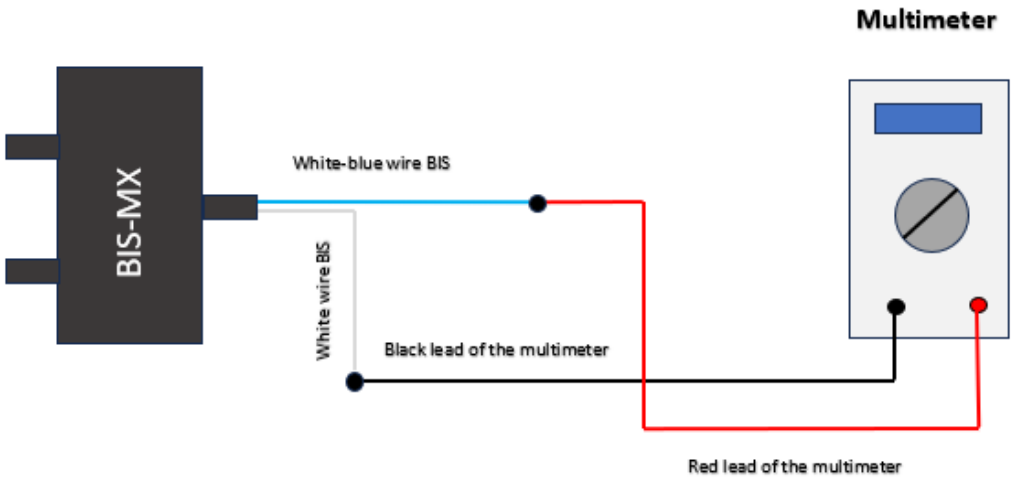

Fig. 5 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 5 Connection Diagram”.
3. Connect the white-blue wire (RS-485 B) of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the white wire (common ground) of the Spark protection unit Omnicomm BIS-MX to the black (negative) lead of the multimeter.
5. Record the reading on the multimeter in the Diagnostic Report under the section: “Input circuits RS-485 B”.

4.6 Measuring the resistance of the RS-232 Tx interface line of the Spark protection unit Omnicomm BIS-MX

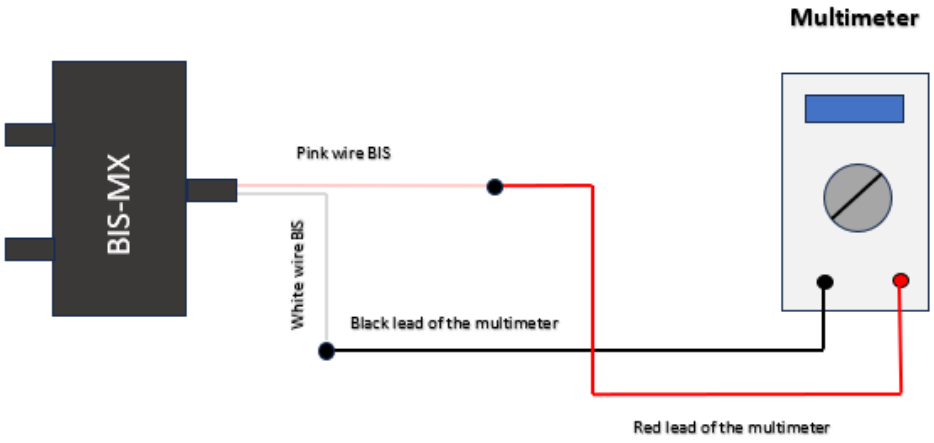

Fig. 6 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 6 Connection Diagram”.
3. Connect the pink wire (RS-232 Tx) of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the white wire (common ground) of the Spark protection unit Omnicomm BIS-MX unit to the black (negative) lead of the multimeter.
5. Record the multimeter reading in the Diagnostic Report under the section: “Input circuits RS-232 Tx”.

4.7 Measuring the resistance of the RS-232 Rx interface line of the Spark protection unit Omnicomm BIS-MX

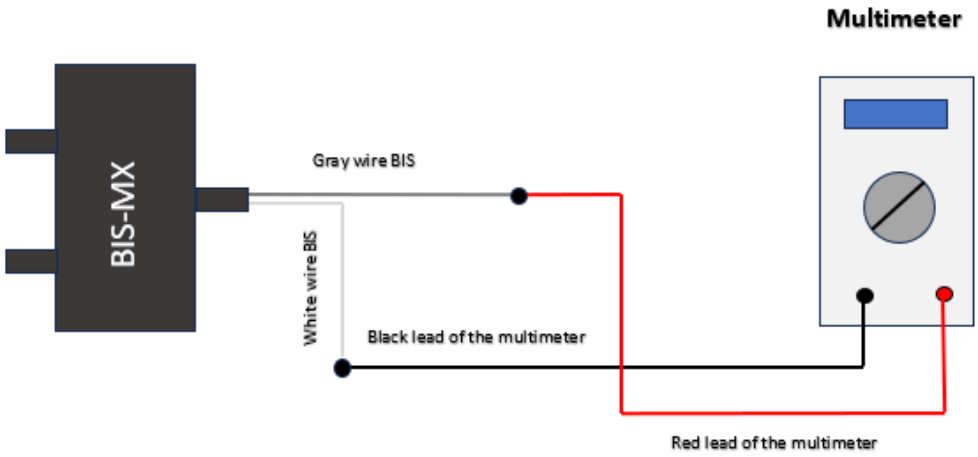

Fig. 7 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 7 Connection Diagram”.
3. Connect the gray wire (RS-232 Rx) of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the white wire (common ground) of the Spark protection unit Omnicomm BIS-MX unit to the black (negative) lead of the multimeter.
5. Record the multimeter reading in the Diagnostic Report under the section: “Input circuits RS-232 Rx”.

4.8 Measurement of the output Voltage at output #1 (for fuel level sensors Omnicomm LLS #1) of the Spark protection unit Omnicomm BIS-MX

Attention!
Wire colors in the connection diagram should be followed only when connecting the installation cable from the fuel level sensors Omnicomm LLS 4 and/or LLS 5 supply kit.

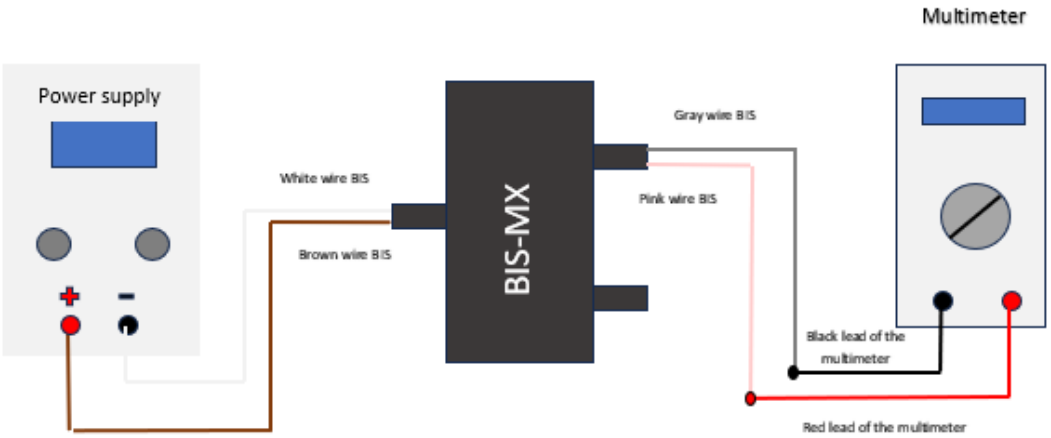

Fig. 8 Connection Diagram

1. Set the power supply Voltage to 12 Volts.
2. Set the multimeter to Voltage measurement mode (range 20 Volts DC).
3. Assemble the connection circuit according to “Fig. 8 Connection Diagram”.
4. Connect the brown wire (+ power input) of the Spark protection unit Omnicomm BIS-MX to the positive GPS-tracker Omnicomm of the power supply.
5. Connect the white wire (– power input) of the Spark protection unit Omnicomm BIS-MX to the negative GPS-tracker Omnicomm of the power supply.
6. Connect the pink wire (+ output #1) of the Spark protection unit Omnicomm BIS-MX unit to the red (positive) lead of the multimeter.
7. Connect the gray wire (– output #1) of the Spark protection unit Omnicomm BIS-MX unit to the black (negative) lead of the multimeter.
8. Turn on the power supply.
9. Record the multimeter reading in the Diagnostic Report under the section: “Power supply Voltage of fuel level sensors Omnicomm LLS #1”.

4.9 Measurement of the output Voltage at output #2 (for fuel level sensors Omnicomm LLS #2) of the Spark protection unit Omnicomm BIS-MX

Attention!
Wire colors in the connection diagram should be followed only when connecting the installation cable from the fuel level sensors Omnicomm LLS 4 and/or LLS 5 supply kit.

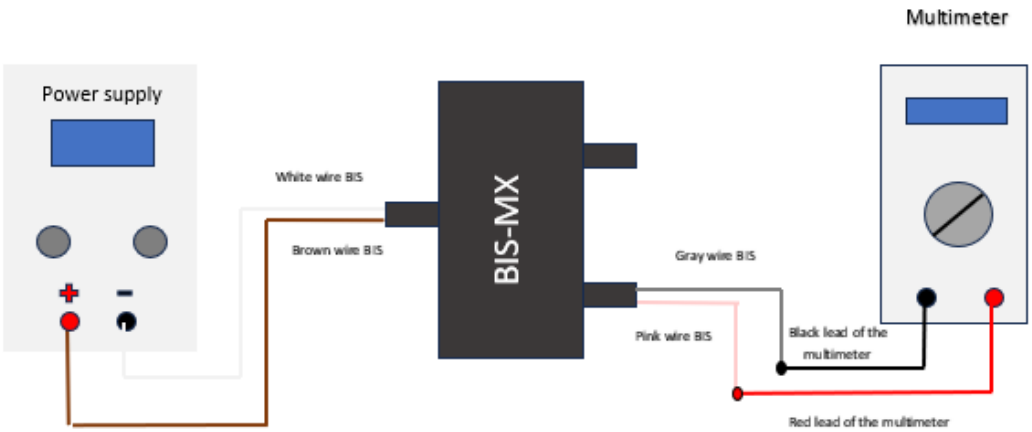

Fig. 9 Connection Diagram

1. Set the power supply Voltage to 12 Volts.
2. Set the multimeter to Voltage measurement mode (range 20 Volts DC).
3. Assemble the connection circuit according to “Fig. 9 Connection Diagram”.
4. Connect the brown wire (+ power input) of the Spark protection unit Omnicomm BIS-MX to the positive GPS-tracker Omnicomm of the power supply.
5. Connect the white wire (– power input) of the Spark protection unit Omnicomm BIS-MX to the negative GPS-tracker Omnicomm of the power supply.
6. Connect the pink wire (+ output #2) of the Spark protection unit Omnicomm BIS-MX unit to the red (positive) lead of the multimeter.
7. Connect the gray wire (– output #2) of the Spark protection unit Omnicomm BIS-MX unit to the black (negative) lead of the multimeter.
8. Turn on the power supply.
9. Record the multimeter readings in the Diagnostic Report, item: “U power supply for fuel level sensors Omnicomm LLS No. 2”

4.10 Measurement of the power supply circuit resistance of output #1 (for fuel level sensors Omnicomm LLS #1) of the Spark protection unit Omnicomm BIS-MX

Attention!
Wire colors in the connection diagram should be followed only when connecting the installation cable from the fuel level sensors Omnicomm LLS 4 and/or LLS 5 supply kit.

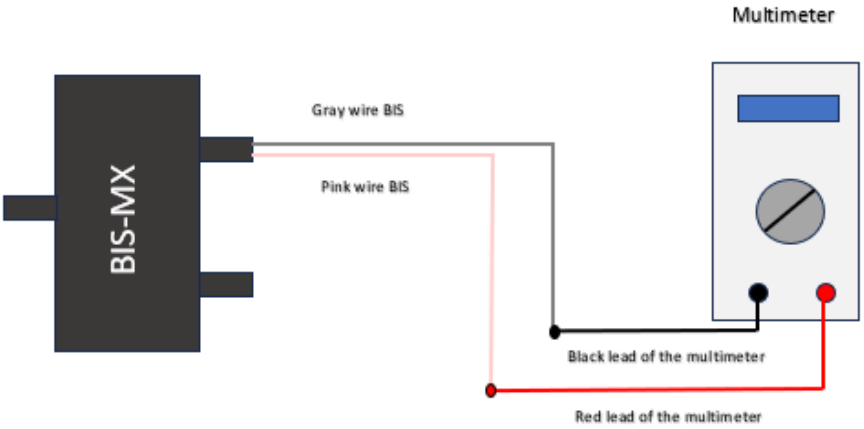

Fig. 10 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 10 Connection Diagram”.
3. Connect the pink wire of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the gray wire of the Spark protection unit Omnicomm BIS-MX to the black (negative) lead of the multimeter.
5. Record the multimeter reading in the Diagnostic Report under the section: “Output #1 Power Supply Positive (Brown)”

4.11 Measurement of the power supply circuit resistance of output #2 (for fuel level sensors Omnicomm LLS #2) of the Spark protection unit Omnicomm BIS-MX

Attention!
Wire colors in the connection diagram should be followed only when connecting the installation cable from the fuel level sensors Omnicomm LLS 4 and/or LLS 5 supply kit.

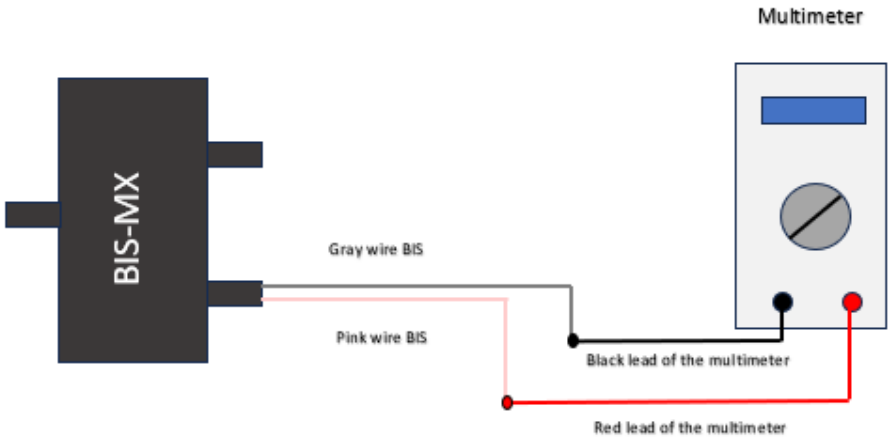

Fig. 11 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 11 Connection Diagram”.
3. Connect the pink wire of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the gray wire of the Spark protection unit Omnicomm BIS-MX to the black (negative) lead of the multimeter.
5. Record the multimeter reading in the Diagnostic Report under the section: “Output #2 Power Supply Positive (Brown)”.

4.12 Measurement of the resistance of the RS-485A interface line of output #1 (for fuel level sensors Omnicomm LLS #1) of the Spark protection unit Omnicomm BIS-MX

Attention!
Wire colors in the connection diagram should be followed only when connecting the installation cable from the fuel level sensors Omnicomm LLS 4 and/or LLS 5 supply kit.

Fig. 12 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 12 Connection Diagram”.
3. Connect the white-orange wire of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the gray wire of the Spark protection unit Omnicomm BIS-MX to the black (negative) lead of the multimeter.
5. Record the multimeter reading in the Diagnostic Report under the section: “Output #1 RS-485 A”.

4.13 Measurement of the resistance of the RS-485B interface line of output #1 (for fuel level sensors Omnicomm LLS #1) of the Spark protection unit Omnicomm BIS-MX

Attention!
Wire colors in the connection diagram should be followed only when connecting the installation cable from the fuel level sensors Omnicomm LLS 4 and/or LLS 5 supply kit.

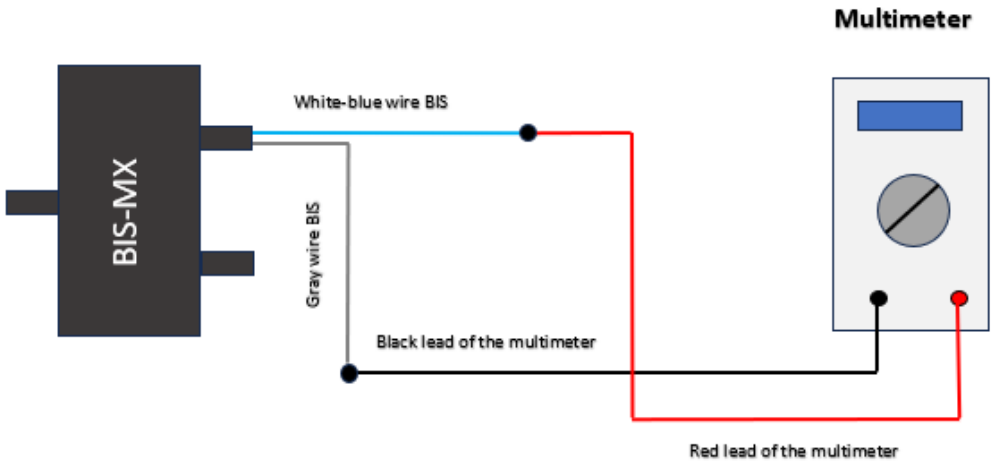

Fig. 13 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 13 Connection Diagram”.
3. Connect the white-blue wire of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the gray wire of the Spark protection unit Omnicomm BIS-MX to the black (negative) lead of the multimeter.
5. Record the multimeter reading in the Diagnostic Report under the section: “Output #1 RS-485 B”.

4.14 Measurement of the resistance of the RS-485A interface line of output #2 (for fuel level sensors Omnicomm LLS #2) of the Spark protection unit Omnicomm BIS-MX

Attention!
Wire colors in the connection diagram should be followed only when connecting the installation cable from the fuel level sensors Omnicomm LLS 4 and/or LLS 5 supply kit.

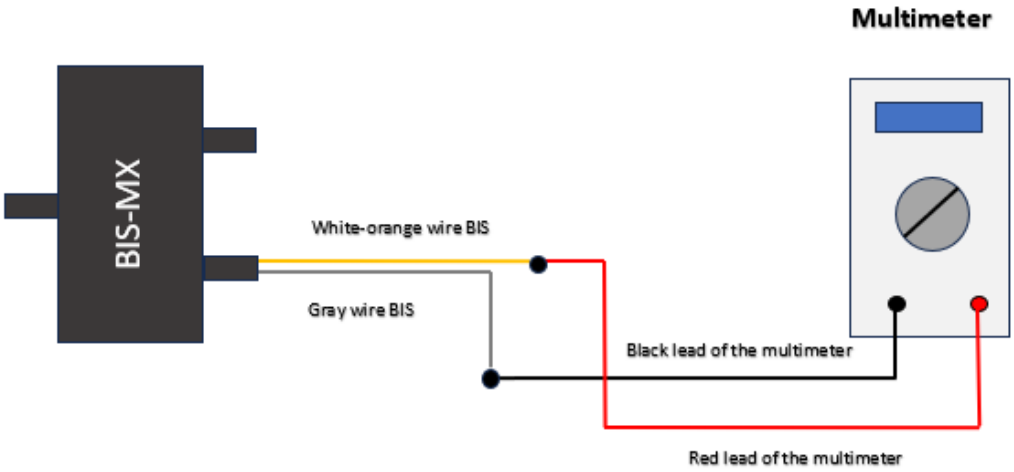

Fig. 14 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 14 Connection Diagram”.
3. Connect the white-orange wire of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the gray wire of the Spark protection unit Omnicomm BIS-MX to the black (negative) lead of the multimeter.
5. Record the multimeter reading in the Diagnostic Report under the section: “Output #2 RS-485 A”.

4.15 Measurement of the resistance of the RS-485B interface line of output #2 (for fuel level sensors Omnicomm LLS #2) of the Spark protection unit Omnicomm BIS-MX

Attention!
Wire colors in the connection diagram should be followed only when connecting the installation cable from the fuel level sensors Omnicomm LLS 4 and/or LLS 5 supply kit.

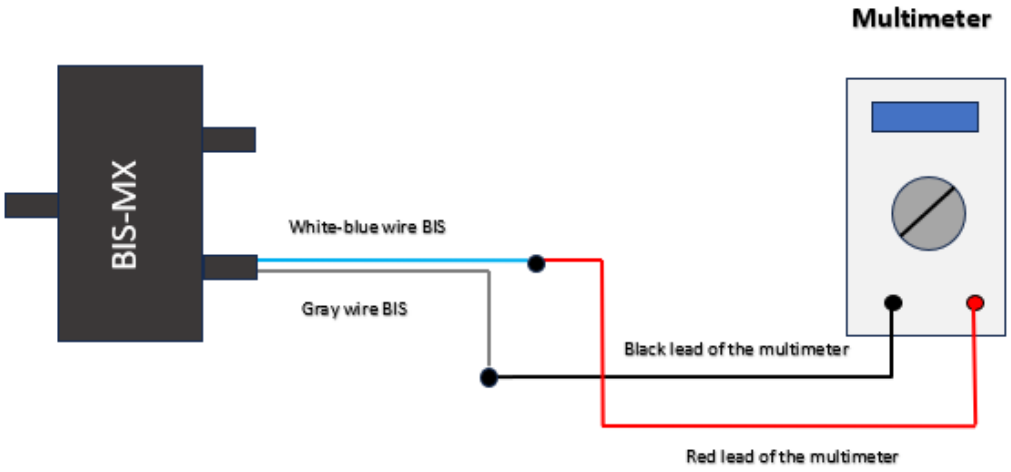

Fig. 15 Connection Diagram

1. Set the multimeter to resistance measurement mode with a range of 10 milliohms (mΩ).
2. Assemble the connection circuit according to “Fig. 15 Connection Diagram”.
3. Connect the white-blue wire of the Spark protection unit Omnicomm BIS-MX to the red (positive) lead of the multimeter.
4. Connect the gray wire of the Spark protection unit Omnicomm BIS-MX to the black (negative) lead of the multimeter.
5. Record the multimeter reading in the Diagnostic Report under the section: “Output #2 RS-485 B”.